BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

FIG. **1** is a sectional view showing a conventional automatic loading/unloading compact disc player;

FIG. **2** is a sectional view showing an embodiment of the automatic loading/unloading compact disc player according to the present invention, in which a disc carriage is located in a raised position; and

FIG. **3** is a sectional view showing an embodiment of the automatic loading/unloading compact disc player according to the present invention, in which the disc carriage is located in a lowered position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is generally able to be adapted for automatically supplying and/or withdrawing a record medium to and/or from a record medium drive member of the apparatus. An embodiment of the present invention will be described in detail with reference to the FIGS. **2** and **3**. Throughout the drawings, reference numerals or letters used in FIG. **1** (Prior Art) will be used to designate like or equivalent elements, for simplicity of explanation.

Referring now to FIG. **2**, an embodiment of the automatic record medium player according to the present invention will be described in detail. The embodiment of FIG. **2** shows an example adapted for, e.g., an automatic loading/unloading compact disc player.

In FIG. **2**, a main chassis **11** is provided for supporting some elements as described below. A sub-chassis **12** with an L-shaped section is mounted on the main chassis **11**. A motor support chassis **13** is provided over the sub-chassis **12**. The motor support chassis **13** holds a motor **30** therebetween. A driving shaft **30***a* of the motor **30** rotatably penetrates upward through the motor support chassis **13**. A first drive member, e.g., a turntable **15** is mounted on the top of the driving shaft **30***a*. Thus, the turntable **15** is driven by the motor **30**.

A second drive member, e.g., a drive gear **17**, is mounted on the driving shaft **30***a* coaxial with the turntable **15**. Thus, the drive gear **17** is driven by the motor **30**. The drive gear **17** is coupled to the bottom of the turntable **15**. For example, the drive gear **17** and the turntable **15** may be made of one body.

The drive gear **17** is coupled to an automatic operation member, e.g., a disc lift **18** and a carriage guide **31**. The drive gear **17** and the disc lift **18** are coupled to each other through a selective coupling member, e.g., a clutch gear **32**, a first idler gear **19** and a second idler gear **20**. The clutch gear **32** and the first and second idler gears **19** and **20** are rotatably mounted on the main chassis **11** by support pins **33**, **21** and **22**, respectively. The support pins **33**, **21** and **22** extend from the main chassis **11**. The drive gear **17** meshes with a large gear section **32***a* of the clutch gear **32**. A small gear section **32***b* of the clutch gear **32** meshes with the first idler gear **19**. The large gear section **32***a* and the small gear section **32***b* of the clutch gear **32** are coaxially made of one body.

The clutch gear **32** is slidable along the support pin **33**. A bias spring **34** is mounted between the clutch gear **32** and the main chassis **11**. Thus, the bias spring **34** biases the clutch gear **32** upward. The upward position of the clutch gear **32** is defined by a stopper **33***a* formed on the top end of the support pin **33**. In the upward position of the clutch gear **32**, the large gear section **32***a* of the clutch gear **32** engages with the drive gear **17**.

The disc lift **18** comprises a lifting rod **23**, a disc carriage **24**, a travelling nut **25** and a lifting rod gear **26**. The lifting rod **23** is rotatably supported on the main chassis **11** through a bearing **27**. The lifting rod gear **26** is fixed to the lifting rod **23** in coaxial thereto. The lifting rod gear **26** then meshes with the second idler gear **20**. Thus, the lifting rod **23** is driven by the motor **30** through the drive gear **17**, the clutch gear **32**, the first and second idler gears **19**, **20** and the lifting rod gear **26**, in turn.

The lifting rod **23** is provided with a feed screw **23***a* on the outer surface. The feed screw **23***a* extends along the axis of the lifting rod **23**. The feed screw **23***a* of the lifting rod **23** screws into the travelling nut **25**. The travelling nut **25** is fixed to the disc carriage **24**.

The disc carriage **24** is also mounted to the carriage guide **31**. The carriage guide **31** comprises a guide rod **35**, a travelling bearing **36** and a guide rod gear **37**. The guide rod **35** is rotatably supported on the main chassis **11** through a bearing **38**. The guide rod gear **37** is fixed to the guide rod **35** coaxial thereto. The guide rod gear **37** is then coupled to the clutch gear **32** through third and fourth idler gears. The third and fourth idler gears are not shown in the drawing but are constituted similar to the first and second idler gears **19** and **20**, respectively. Thus, the guide rod **35** is also driven by the motor **30** through the drive gear **17**, the clutch gear **32**, the third and fourth idler gears and the guide rod gear **37** in turn.

The guide rod **35** is provided with a feed screw **35***a* on the outer surface. The feed screw **35***a* extends along the axis of the guide rod **35**. The feed screw **35***a* of the guide rod **35** screws into the travelling bearing **36**. That is, the travelling bearing **36** is similar to the travelling nut **25** of the disc lift **18**. The travelling bearing **36** is fixed to the disc carriage **24**.

The guide rod **35** of the carriage guide **31** is driven by the drive gear **17** together with the lifting rod **23**. Thus, the disc carriage **24** stably moves in the direction along the lifting rod **23** and the guide rod **35**. During the movement, the disc carriage **24** is prevented from rotating around the lifting rod **23** due to the carriage guide **31**.

The rotation of the motor **30** changes in response to a loading phase or an unloading phase in the automatic disc loading operation. For example, the motor **30** rotates in a prescribed first direction during the loading phase. The motor **30** rotates in a second direction opposite to the first direction during the unloading phase. Thus, the disc carriage **24** travels downward, as shown by an arrow A in the figure, during the loading phase. The disc carriage **24** travels upward, as shown by an arrow B in the figure, during the unloading phase.

The disc carriage **24** is shaped to an almost rectangular plate. Further, the disc carriage **24** defines a round depression for carrying a disc **28** in the center of the rectangular plate and an opening around the center of the depression. The round depression has a diameter almost equal to the diameter of the disc **28** so that the disc **28** is placed in the correct position on the disc carriage **24**. The opening allows the turntable **15** to penetrate the disc carriage **24** and to engage with the